VAISALA

INSTRUCTION MANUAL
for

HUMIDITY TRANSMITTER HMT 14

SENSING HEADS HMH 14

EDITION : HMT14-T0075-1.1

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We thank you for your choice of purchasing our Humidity Transmitter HMT 14. This precision instrument is the result of many years of research and experience in the field of humidity measurement.

Before your first measurement, please read this manual in order to obtain the best measuring results.

TRANSMITTER HMT 14 AND SENSING HEADS HMH 14

General

The Vaisala Company has developed a new modular transmitter which consists of two main parts, the Head and Transmitter. It is mainly intended for fixed installations, for instance in industry and air conditioning.

The sensing element is a Vaisala HUMICAP Humidity Sensor based on capacitive change in a thin film capacitor. The Sensing Head can be either directly to the Transmitter or connected to it with a cable which enables flexible and easy installation and cramped operating conditions.

In addition to Humidity Sensors the Sensing Head can be equipped for temperature sensing with a Pt 100 temperature Element. The element is connected with a 3-wire connection to a separate measuring amplifier directly in the Transmitter. In all, there are two standard models of the Sensing Heads.

The Sensing Head is made of stainless steel and the sensors are mounted in its tip. The Sensors are protected mechanically either by means of a plastic grid or a 150 µm sintered filter.

The actual Transmitter unit is enclosed in an aluminium box which has terminal blocks for the supply voltage and the signal. The Transmitter output signal can be selected either 0...20 mA or 4...20 mA. This is the only selection to be connected [illegible] other measurement and control [illegible]

We thank you for your choice of purchasing our HUMICAP Humidity Transmitter HMT 14. This precision instrument is the result of many years of research and experience in the field of humidity measurement.

Before your first measurement, please read this manual carefully in order to obtain the best measuring results.

1. HUMIDITY TRANSMITTER HMT 14 AND SENSING HEADS HMH 14

1.1 General

The Vaisala Company has developed a new modular Humidity Transmitter which consists of two main parts, the Sensing Head and Transmitter. It is mainly intended for fixed installations, for instance in industry and air conditioning.

The sensing element is a Vaisala HUMICAP 5832 HM Humidity Sensor based on capacitive change in a polymer thin film capacitor. The Sensing Head can be either fastened directly to the Transmitter or connected to it with a special cable which enables flexible and easy installation in difficult and cramped operating conditions.

In addition to Humidity Sensors the Sensing Heads can also be equipped for temperature sensing with a Pt 100 Temperature Element. The element is connected with a 3-wire connection to a separate measuring amplifier directly via the Transmitter. In all, there are two standard models of the Sensing Heads.

The Sensing Head is made of stainless steel pipe and the Sensors are mounted in its tip. The Sensors can be protected mechanically either by means of a plastic grid or a 133 µm sintered filter.

The actual Transmitter unit is enclosed in an aluminium box which has terminal blocks for the supply voltage and output signal. The Transmitter output signal can be selected to be either 0...20 mA or 4...20 mA. Thus it can easily be connected to other measurement and control equipment.

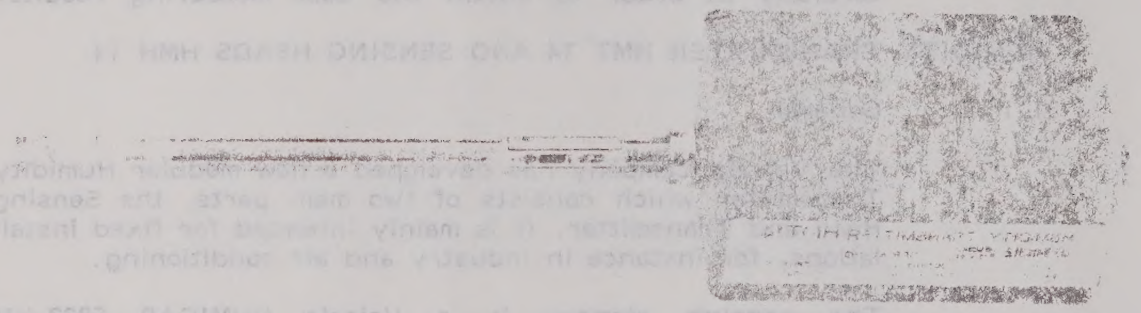


Figure 1. Humidity Transmitter HMT 14 and Sensing Head HMH 14 UT

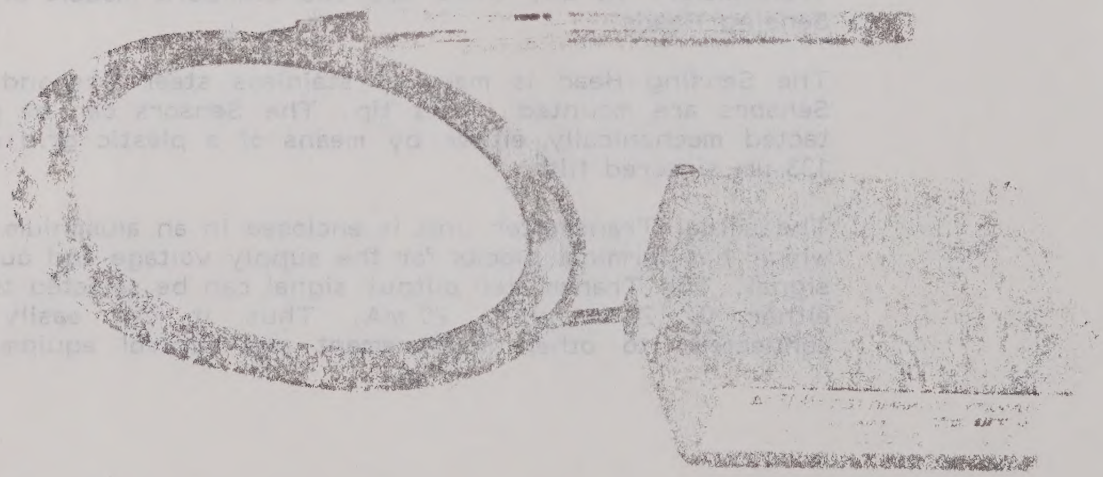


Figure 2. Humidity Transmitter HMT 14 and Sensing Head HMH 14 UTA

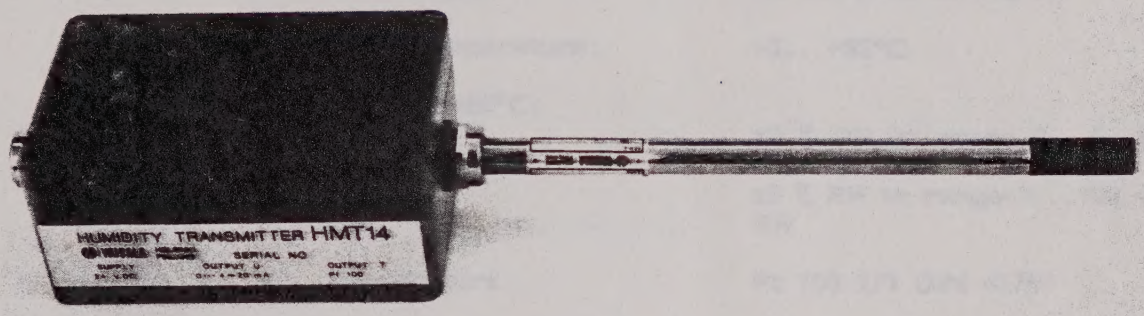


Figure 1. Humidity Transmitter HMT 14 and Sensing Head HMH 14 UT

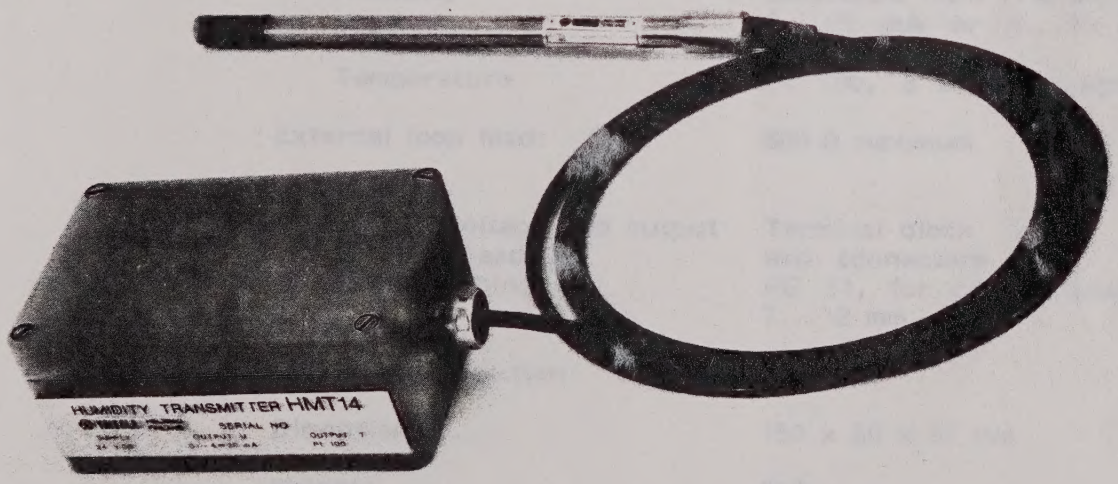


Figure 2. Humidity Transmitter HMT 14 and Sensing Head HMH 14 UTA

5 SPECIFICATIONS

5.1 Humidity Transmitter HMT 14

Measuring range:	
Humidity	0...100 % RH
Temperature	Pt 100 (-40... + 150°C)
Operating temperature:	-55...+55°C
Accuracy at +20°C:	
Humidity	±2 % RH in range 0...90 % RH ±3 % RH in range 90...100 % RH
Temperature	Pt 100 1/3 DIN class (max ±0.05 % of reading)
Electronics temperature coefficient:	
Supply voltage:	21 V...35 V DC
Power consumption:	<1 W (supply voltage 24 V, output 20 mA)
Outputs:	
Humidity	Selectable from 0...20 mA or 4...20 mA
Temperature	Pt 100, 3 wire, 0...100°C
External loop load:	500 Ω maximum
Connections	
Supply voltage and output	Terminal block
Sensing Head	With connectors
Cable shielding	360° at cable entry, for cable Ø 7...12 mm
Enclosure protection:	IP 65
Dimensions:	130 x 30 x 27 mm
Weight:	150 g

2. SPECIFICATIONS

2.1. Humidity Transmitter HMT 14

Measuring range:	
Humidity	0...100 % RH
Temperature	Pt 100 (-40...+115°C)
Operating temperature:	+5...+55°C
Accuracy at +20°C:	
Humidity	±2 % RH in range 0...80 % RH ±3 % RH in range 0...100 % RH
Temperature	Pt 100 1/1 DIN 43760
Electronics temperature coefficient:	Less than ±0.05 %/°C
Supply voltage:	21 V...35 V DC
Power consumption:	~1 W (supply voltage 24 V DC, output 20 mA)
Output:	
Humidity	Selectable from Transmitter, 0...20 mA or 4...20 mA
Temperature	Pt 100, 3 wire connection
External loop load:	600 Ω maximum
Connections:	
Supply voltage and output	Terminal block
Sensing Head	With connectors
Cable bushing	PG 11, for cable diameter 7...12 mm
Enclosure protection:	IP 65
Dimensions:	150 x 80 x 57 mm
Weight:	550 g

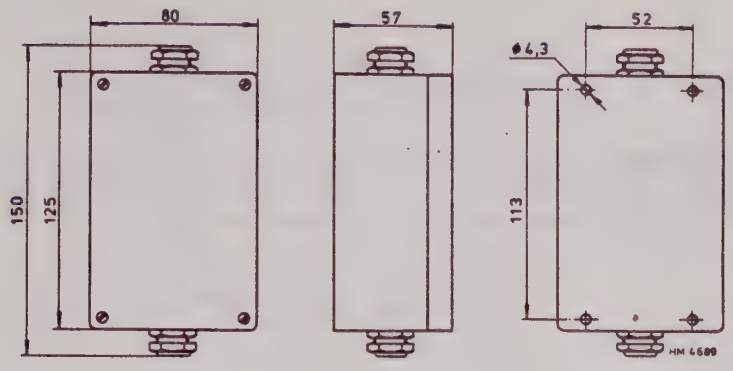


Figure 3. HMT 14 dimensions

2.2. Sensing Heads HMH 14

HMH 14 UT
and HMH 14 UTA

Operating temperature:	-40...115°C
Temperature coefficient:	
Humidity	0.05 % RH/°C
Maximum pressure:	2 MPa, type tested
Sensor:	
Humidity	HUMICAP 5832 HM
Temperature	Pt 100 1/1 DIN 43760
Sensor protection:	Plastic Grid or 133 µm Sintered Filter
Dimensions:	HMH 14 UT
Length	215 mm
Diameter	Ø12 mm
Weight	95 g
	HMH 14 UTA
Total length	1815 mm
Cable length	1600 mm
Diameter	Ø12 mm
Weight	195 mm

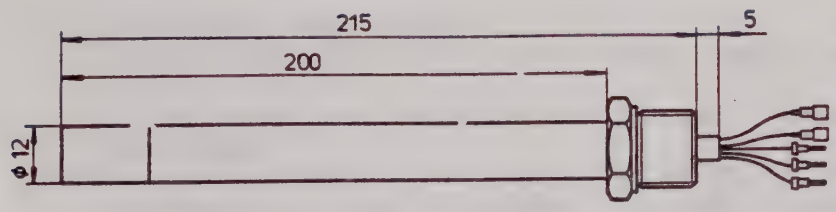


Figure 4. HMH 14 UT dimensions

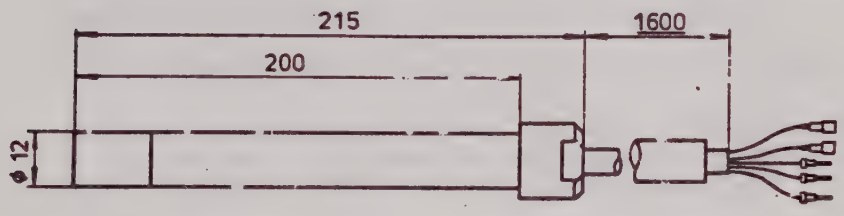


Figure 5. HMH 14 UTA dimensions

3. PREPARATIONS FOR USE

Before the Humidity Transmitter HMT 14 can be taken into use the Sensing Head must be connected to the Transmitter, the output signal selected if necessary and calibration performed according to chapter3.3.

3.1. Connecting of Sensing Head to Transmitter

The connection of different Sensing Heads is performed by paying close attention to the following instructions.

3.1.1. Connection of Sensing Heads HMH 14 UT

- Open Transmitter cover.
- Remove cable bushing on side of Sensing Head.
- Fasten Sensing Head to Transmitter tightly with cable bushing counter nut.
- Connect the numbered wires of the Sensing Head cable to the correspondingly numbered connectors on the Transmitter component board. Be careful in connecting the Humidity Sensor coaxial connector (1 and 2). The contact is reliable when the coaxial connectors are locked in place.
- Disconnect the capacitance compensation of coaxial cable by cutting the jumper wires on the Transmitter component board (see connection instruction on cover and layout drawing HM 3644, part 1).

Connection of Sensing Head HMH 1x UTA

- Clean Transmitter cover.
- Loosen fastening nut of cable bushing, rubber sealing washer.
- Insert cable wires through fastening nut, rubber sealing washer.
- Connect numbered wires 1 to 7 corresponding numbered [illegible]
- [illegible] connector contact is reliable when [illegible]

[illegible] Humidity Transmit[illegible]
[illegible] selected degree [illegible]
[illegible] is connected to [illegible]

[illegible]

[illegible]

Calibration

Before use humidity calibration must always be [illegible] for the Transmitter together with the Sensing [illegible] Sensing Head or the HUMICAP 5832 HM Sensing [illegible] used a new calibration must also be performed [illegible] recommended that the calibration be checked [illegible] [illegible] once every year, depending on operation [illegible] to suit the required measurement accuracy.

Operation Connection of Transmitter

A correct connection of the Sensing Head and switching [illegible] without signal the calibration connections given in this [illegible] must be the Transmitter. This result [illegible]

- [illegible] dc voltage source 22 [illegible] - 35 VDC
- [illegible] dc ammeter, 1.0 - 20.1 mA
- [illegible] dc resistor, 100 - 600 Ω.

The voltage source, adjusted for instance to 24 V, is connected to the Transmitter terminal blocks +22 V (+pole). The ammeter -pole is connected [illegible]

3.1.2. Connection of Sensing Head HMH 14 UTA

- Open Transmitter cover.
- Loosen fastening nut of cable bushing, rubber seal and washer.
- Insert cable wires through fastening nut, rubber seal and washer.
- Connect numbered wires to to correspondingly numbered connectors on the Transmitter component board. The coaxial connector contact is reliable when the connectors are locked in place.
- Tighten the bushing so that the cable cannot move.

NOTE: When Sensing Head HMH 14 UTA is used the jumper wires mentioned in chapter 3.1.1. must be connected.

3.2. Selection of Current Output 0...20 mA or 4...20 mA

For the current output of the Humidity Transmitter HMT 14, 0...20 mA or 4...20 mA can be selected depending on what kind of system the Transmitter is connected to.

The selection is performed with the output selection jumpers on the Transmitter component board. The jumper positions are marked on the component board and on the connection instruction on the cover.

NOTE! At the factory the selection jumpers have been set to position 4...20 mA.

3.3. Calibration

Before use humidity calibration must always be performed for the Transmitter together with the Sensing Head. When the Sensing Head or the HUMICAP 5832 HM Sensor is replaced a new calibration must also be performed. It is also recommended that the calibration be checked for instance two or three times a year, depending on operation conditions and on the required measurement accuracy.

3.3.1. Calibration Connections of Transmitter

After connection of the Sensing Head and selection of the output signal the calibration connections given in Fig. 6 are made for the Transmitter. This requires:
- 1 pc voltage source, 21 V - 35 VDC
- 1 pc ammeter, 0.0 - 20.0 mA
- 1 pc resistor, 100 - 600 Ω

The voltage source, adjusted for instance to 24 V, is connected to the Transmitter terminal blocks +24 V (+ pole) and 0 V (-pole). The ammeter -pole is connected to terminal block O V. The resistor, e.g. 100 Ω, is connected between the ammeter +pole and terminal block Iout.

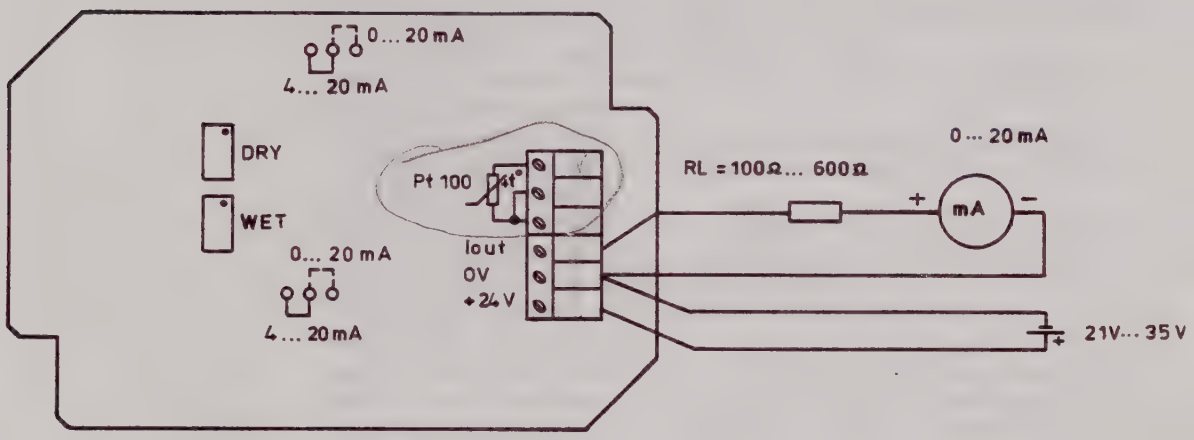


Fig. 6 Calibration connections

3.3.2. Different Calibration Procedures

The calibration procedure used depends on the application and desired accuracy. The Calibrator HMK 11 is used for calibration. Calibration is based on the known equilibrium relative humidity of saturated salt solutions of lithium chloride LiCl (12 % RH) and potassium sulphate K_2SO_4 (97 % RH). Bottles for both solutions are housed in the metal box of HMK 11 providing a stable temperature. The K_2SO_4 bottle can also be used for natrium chloride NaCl (75 % RH) salt solution for use as a humidity reference. A thermometer on the cover measures the temperature of the Calibrator. A humidity and temperature table for the salt solutions is on the cover of the Calibrator.

NOTE: Instructions for initial preparations of new Calibrator HMK 11 and making salt solutions are given in chapter 4.

3.3.2.1. Measurements in Range 0...100 % RH

Normal calibration for whole humidity range.

- Keep the Sensing Head and Transmitter for at least 30 minutes at the same temperature as the Calibrator HMK 11 before calibration to allow the temperature to stabilize.
- Remove sensor guard of Sensing Head.
- Place the Sensing Head into the LiCl bottle (12 % RH) of the Calibrator HMK 11.
- Read the thermometer on the Calibrator lid and note the corresponding output signal mA-value for LiCl from the subsequent table.
- Wait for 5 minutes and adjust with potentiometer R8 (DRY adjustment) the indication of the ammeter to read the value obtained from the table.
- Place the Sensing Head into the K_2SO_4 bottle.
- Note the output signal mA-value for K_2SO_4 from the subsequent table that corresponds to the temperature.
- Wait for 5 minutes and adjust with potentiometer R13 (WET adjustment) the indication of the ammeter to read the value obtained from the table.
- As the adjustments may affect each other it is adviseable to repeat them until the current readouts are the same as the given values when shifting the Sensing Head from one bottle to the other.

NOTE! Other adjustments must not be touched.

3.3.2.2. Measurements in Range 0...80 % RH

If the Sensing Head is used continuously in a humidity below 80 % RH it is better to use natrium chloride NaCl (75 % RH) instead of K_2SO_4. Calibration is performed in the same way as described previously.

3.3.2.3. Long Term or Continuous Measurements above 75 % RH

In case the Sensing Head is used for hours or continuously in a humidity over 75 % RH and the best accuracy is desired, the Sensing Head is kept in the K_2SO_4 salt solution for 7 hours before adjustment.

3.3.2.4. Calibration Table

The effect of temperature on humidity of the salts.

Values corresponding to 4...20 mA output signal.

T/°C		10	15	20	25	30	35	40	45
LiCl	%RH	13.3	12.8	12.4	12.0	11.8	11.7	11.6	11.5
	mA	6.13	6.05	5.98	5.92	5.89	5.87	5.86	5.84
K_2SO_4	%RH	97.9	97.5	97.2	96.9	96.6	96.4	96.2	96.0
	mA	19.66	19.60	19.55	19.50	19.46	19.42	19.39	19.36
NaCl	%RH	75.2	75.3	75.5	75.8	75.6	75.5	75.4	75.1
	mA	16.03	16.05	16.08	16.13	16.10	16.08	16.06	16.02

Values corresponding to 0...20 mA output signal.

T/°C		10	15	20	25	30	35	40	45
LiCl	%RH	13.3	12.8	12.4	12.0	11.8	11.7	11.6	11.5
	mA	2.66	2.56	2.48	2.40	2.36	2.34	2.32	2.30
K_2SO_4	%RH	97.9	97.5	97.2	96.9	96.6	96.4	96.2	96.0
	mA	19.58	19.50	19.44	19.38	19.32	19.28	19.24	19.20
NaCl	%RH	75.2	75.3	75.5	75.8	75.6	75.5	75.4	75.1
	mA	15.04	15.06	15.10	15.16	15.12	15.10	15.08	15.02

NOTE! Calibration in LiCl bottle is not recommended in temperatures below +18°C.

4. CALIBRATOR HMK 11 - PREPARATION FOR USE

- Open the lid by removing the screws.
- Take the rubber plugs from the box.
- Cut the perforated holes in the plastic lid with a knife (only those holes that are required).
- Preparation of salt solution:

LiCl bottle

- Pour distilled water into the LiCl bottle up to the lower edge of the black marking line. See Fig. 7.

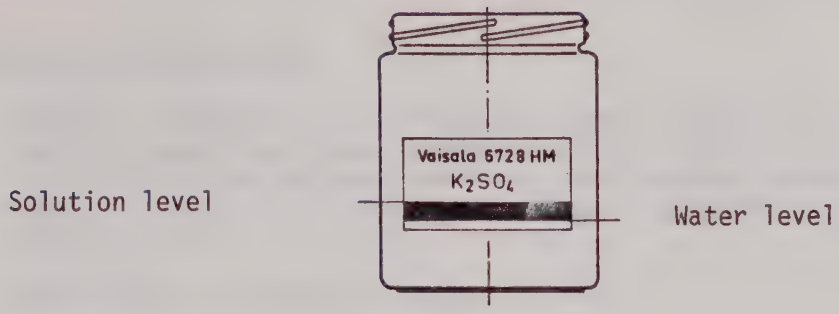


Fig. 7 Salt solution bottle

- Add lithium chloride (LiCl) into the bottle until the solution reaches the upper edge of the marking line while simultaneously stirring the solution (when LiCl dissolves the solution becomes warm).

K_2SO_4 bottle

- Pour distilled water into the K_2SO_4 bottle up to the lower edge of the black marking line.
- Adding K_2SO_4 salt is made in the same way as with LiCl above (when K_2SO_4 dissolves the solution becomes cool).

- When closing the metal cover with screws check that plastic lids are tightly on the bottles.
- Put the plugs into the calibration holes. The holes are always to be kept shut except when a prode is inserted into the hole for calibration.
- Leave the calibrator closed for 24 hours to allow the temperature differences to stabilize.
- Mark the date of preparation of the solutions with a piece of tape on the calibrator lid.
- In normal use the solutions will stay useful in the bottles for at least a year.
- The NaCl solution is made in the K_2SO_4 bottle in the same way as the K_2SO_4 solution.

INSTALLATION INSTRUCTIONS

[illegible] the Transmitter and especially [illegible] read [illegible] chapter 6. [illegible]. This will help you to avoid mistakes associated with humidity measurements. If you [illegible] operation of reliable and accurate measurements.

Mounting the Humidity Transmitter HMT 14

The transmitter is mounted in a vibration-free place, preferably in a vertical position. For mounting there are [illegible] the cover.

Connecting the Humidity Transmitter HMT 14

The supply voltage is connected via the PG11 cable gland to a terminal block. Route to terminal +Ua V and -. The polarity is [illegible]. The output signal corresponding to the humidity is obtained from terminals Iout and 0 V. The cable gland is [illegible] the Pt 100 Temperature Element is [illegible] the [illegible] the connection instruction on the circuit board. [illegible]. The Temperature Element [illegible] Temperature Transmitter [illegible] Connection is 2 or 3 wire connection.

Mounting the Sensing [illegible]

Mounting is performed either using the mounting [illegible] the Transmitter HMT 14 or by fastening the [illegible] from the 12 mm pipe of the Sensing Head for Installation with a bushing ") directly to the measurement site [illegible] equivalent)

[illegible] of Sensing Head HMH 14 GTA

Mounting is performed with the 12 mm Sensing [illegible] flange [illegible] intended for a 12 mm [illegible] the case the mounting [illegible] Fig. 3. Note that the measurement point give [illegible] which measurements [illegible] Note the min. [illegible] about 17 mm.

[illegible] spring for [illegible]
[illegible]
[illegible] measures 25 bar
[illegible] 12 (20.4 mm)

5. INSTALLATION INSTRUCTIONS

Before installation of the Transmitter and especially of the Sensing Head read thoroughly chapter 6. USE. This will help you to avoid mistakes associated with humidity measurement and you can be certain of reliable and accurate measurement.

5.1. Mounting of Humidity Transmitter MHT 14

The Transmitter is mounted in a vibration-free place, preferably in a vertical position. For mounting there are four holes under the cover.

5.2. Connections of Humidity Transmitter HMT 14

The supply voltage is connected via the PG11 cable bushing to a terminal block, +pole to terminal +24 V and -pole to terminal 0 V. The output signal corresponding to the humidity is obtained from terminals Iout and 0 V. The resistor output of the Pt 100 Temperature Element is obtained as according to the connection instruction on the cover from terminal blocks Pt 100. The Temperature Element can be connected to a Pt 100 Temperature Transmitter or to an Indicator with a 2 or 3-wire connection.

5.3. Mounting of Transmitter when using Sensing Head HMH 14 UT

Mounting is performed either using the mounting holes on the Transmitter HMT 14 or by fastening the Transmitter from the 12 mm pipe of the Sensing Head for instance with a bushing *) directly to the measurement site (duct or equivalent).

5.4. Mounting of Sensing Head HMH 14 UTA

Mounting is performed with the 12 mm Sensing Head tube. For mounting, a bushing *) intended for a 12 mm pipe can be used for instance. In this case the mounting depth can be adjusted so that the measurement point gives a representative view of the humidity from which measurement is desired. When bending the coaxial cable note that the minimum radius is about 50 mm.

*) Suitable bushing for instance:
AGRO 1013.60.15
- maximum pressure 20 bar
- thread PK 13 (20.4 mm)

Electrical Connections

The connections are made to the terminals on the Transmitter compartment board which have numbers corresponding to the sensing head wire numbers. The coaxial connector is polarised. The connector is keyed but can be touched except when [illegible] Connection instructions are given on page [illegible] of HM 3989.

Humidity Measurement

Temperature equilibrium is one of the biggest problems when [illegible] relative humidity measurement. Even the slightest temperature difference between the air being measured and the measuring element causes an error in the measurement result.

For instance at a temperature of + 20°C with a relative humidity of 50 % [illegible] temperature difference [illegible] measuring element [illegible].

[illegible] relative humidity of 50 % [illegible] is caused to [illegible]. One of the main reasons [illegible] can be heat conduction. A temperature difference between the surrounding and measurement point is caused by heat conduction. For this reason avoid mounting the Sensing Head in a place where large temperature difference may be present e.g. avoid mounting in a place where the Sensing Head is subjected to strong heat radiation. In the Sensing Heads HMH [illegible] heat conduction has been prevented by heat insulating the part between the tube and sensor guard.

Safety Protection and Marking

The HUMICAP 180 Humidity Sensor in the Sensing Head may be protected either with a plastic grid or a [illegible] filter.

[illegible] PLUG-IN UNITS

A measurement in clean air or [illegible] impurities are not present a plastic grid can be used. These are measurement for instance in normal room spaces, constant humidity rooms, storage spaces or in different kinds of test chambers.

For measurements where impurities at the measurement may be present a [illegible] filter must be used. These measurements are [illegible] powder materials for instance

5.5. Sensing Head Connections

The connections are made to the terminals on the Transmitter component board which have numbers corresponding to the Sensing Head wire numbers. The coaxial connector contact is reliable when the connector is locked in place. The connections need not be touched except when replacing a Sensing Head. Connection instructions are given in drawings HM 3668 and HM 3669.

6. USE

6.1. Humidity Measurement

Temperature equilibrium is one of the biggest problems connected with relative humidity measurement. Even the slightest temperature difference between the site measurement and the measuring element causes an error in the measurement result.

For instance at a temperature of + 20°C with a relative humidity of 50 % RH, a±1°C temperature difference between the measurement site and the measuring element cases a measurement error of about ±3 % RH.

Correspondingly with a relative humidity of 90 % RH the error is about ±6 % RH. One of the main reasons of the temperature difference can be heat conduction. A large temperature difference between the surroundings and measurement point is caused by heat conduction. For this reason avoid mounting the Sensing Head in a place where a large temperature difference may be present. Also avoid mounting in a place where the Sensing Head is subjected to strong heat radiation. In the Sensing Heads HMH 14 harmful heat conduction has been prevented by heat insulating the part between the tube and Sensor quard.

6.2. Sensor Protection and Handling

The HUMICAP 5832 Humidity Sensor in the Sensing Head can be protected either with a plastic grid or a 133 µm sintered filter.

NOTE! THE SENSOR MUST NOT BE TOUCHED.

In measurements in clean air or where impurities are not present a plastic grid can be used. These are measurements for instance in normal room spaces, constant humidity rooms, storage spaces or in different kinds of test chambers.

For measurements where impurities at the measurement site may be present a 133 µm sintered filter must be used. These are measurements in air conditioning ducts or solid powder materials for instance.

The Humidity Sensor can be cleaned by removing the Sensing Head and by removing the dust, soot etc. by blowing clean [illegible] with compressed air.

The Humidity Sensor can be cleaned by removing the Sensor guard and by removing the dust, soot etc. by blowing gently (not with compressed air).

Washing the Sensor is not recommended but a very dirty Sensor can be cleaned by immersing it into distilled water for 1 - 2 minutes which is usually sufficient to remove the dirt. The Sensor is dried by gentle blowing and by swinging the Sensing Head. Other solvents must not be used.

When cleaning the Sensor the measurement current must be switched off until the Sensor has dried.

A Sensor protected by a sintered filter does not generally have to be cleaned.

7. MAINTENANCE

7.1. General

The adjustments of the Humidity Transmitter HMT 14 have been done at the factory at a temperature of +20°C with a 24 VDC supply voltage and a loop resistance of 300Ω. Every instrument has been subjected to a guality inspection to ensure that the performance values given shall be met. Thus normally the only adjustments which need be done are the DRY and WET adjusments in humidity calibration after connecting or replacement of the Sensing Head, after replacing the Humidity Sensor and when striving for the highest possible accuracy when the ambient temperature differs fron the value above. For maintenance adjustments calibration connections according to paragraph 3.3.1. are always made.

7.2. Voltage Adjustments

- The voltage measured from point P8 with reference to ground must be 11.4...12.6 V.
- With potentiometer R1 the voltage of point P9 is adjusted to +3.60 V ±0.01 V.
- The voltage measured from point P7 with reference to ground must be -4.8...-5.4 V.
- The voltage measured from point P10 must be -3.60 V ±0.02 V.

7.3. Multivibrator and Current Generator Adjustments

For this, 47 pF and 56 pF ±5 % capacitors connected to the Humidity Sensor connector socket instead of the HUMICAP 5832 Sensor are required.

- Remove Linearization Unit from its connector.
- Locate the output selection jumpers and jumper position corresponding to the desired output.
- Locate the 47 pF capacitor equipped with a connector
- [illegible] HUMICAP® 5272 RH Sensor
- [illegible] 20mV adjustment (R8) the voltage between [illegible] to 0.0 mV ±0.1 mV.
- [illegible] 20 mA adjust output current [illegible] mA [illegible] potentiometer R27. Note: The [illegible] set yet entirely to 0 mA.
- [illegible] 20 mA adjust output current [illegible] mA with potentiometer P22.
- [illegible] the 47 pF capacitor equipped with a connector [illegible] HUMICAP® 5272 RH Sensor [illegible] connector the multivibrator does not [illegible] this case switch off the supply voltage [illegible] components.
- [illegible] the voltage between points P12 and [illegible] mV ±0.1 mV with "ZERO" adjustment R71.
- [illegible] 20 mA adjust output current to [illegible] mA with potentiometer R22.
- [illegible] 2 mA adjust output current to [illegible] mA with potentiometer R19.
- [illegible] the output adjustments affect each other [illegible] repeated until the current outputs are in [illegible]

Adjustment of Linearization Unit

- Check that voltage between points P12 and [illegible] 100 mV
- Place Linearization Unit carefully into [illegible] socket and ensure that the contacts are [illegible] connector has no polarization pin.
- Adjust the voltage between points P12 and P11 to 0 mV ±0.1 mV with potentiometer R5 in the Linearization Unit

Replacement of Sensing Head

[illegible] sensing head [illegible] the sensing head [illegible] Special cable so if the cable is damaged the [illegible] must be replaced.

- Remove Linearization Unit fron its connector.
- Check that the output selection jumpers are in the position corresponding to the desired output.
- Place the 47 pF capacitor equipped with a connector in place of the HUMICAP 5832 HM Sensor.
- Adjust with DRY adjustment (R8) the voltage between points P12 and P11 to 0.0 mV ±0.1 mV.
- In range 0...20 mA adjust output current to 0.10 mA ±0.02 mA with potentiometer R27. Note! The current output will not go entirely to 0 mA.
- In range 4...20 mA adjust output current to 4.00 mA ±0.02 mA with potentiometer R22.
- Place the 56 pF capacitor equipped with a connector in place of the HUMICAP 5832 HM Sensor. Note! When replacing capacitor the multivibrator does not always start, in this case switch off the supply voltage for a moment.
- Adjust the voltage between points P12 and P11 to 100.0 mV ±0.1 mV with WET adjustment (R13).
- In range 0...20 mA adjust output current to 20.00mA ±0.02 mA with potentiometer R20.
- In range 4...20 mA adjust output current to 20.00mA ±0.02 mA with potentiometer R19.
- As the output adjustments affect each other they must be repeated until the current outputs are in the given limits.

7.4. Adjustment of Linearization Unit

- Check that voltage between points P12 and P11 is 100.0mV.
- Place Linearization Unit carefully into its connector socket and ensure that the contacts are proper. The connector has no polarization pin.
- Adjust the voltage between points P12 and P11 to 94.0 mV ±0.1 mV with potentiometer R5 in the Linearization Unit.

7.5. Replacement of Sensing Head

If Sensing Head HMH 14 UT is to be replaced by Sensing Head HMH 14 UTA, the jumper wires on the Transmitter circuit board must be soldered back in place. Correspondingly, when a replacement the other way around is desired the jumper wires are cut (see cover connection instruction and layout drawing HM 3644). The Sensing Head cable is a fixed length special cable so if the cable is damaged the whole Sensing Head should be replaced.

Replacement of Sensor

HUMICAP 5832 HM Humidity Sensor

If the sensor is damaged it can be replaced with a new
by first unplugging the damaged Sensor with
connector and by putting a new Sensor in
A new humidity calibration must always
[illegible]

130 Temperature Element

Replacement of the Temperature Element is
done with a small soldering iron.

Soldering must be performed so that no smoke
come to the HUMICAP 5832 HM Sensor.

[illegible]

Vaisala Oy issues a guarantee for the functioning of
HUMICAP Humidity Transmitter under normal
[illegible] for material and workmanship,
Year from date of purchase; For Humidity Sensor, three
months from date of purchase.

Exceptional operating conditions, damage due to careless
handling and misapplication do not entitle the
[illegible]

7.6. Replacement of Sensor

7.6.1. HUMICAP 5832 HM Humidity Sensor

If the Sensor is damaged it can be replaced with a new one by just simply disconnecting the damaged Sensor with it´s connector and by putting a new Sensor in place. After replacement a new humidity calibration must always be performed according to chapter 3.3.

7.6.2 Pt 100 Temperature Element

Replacement of the Temperature Element is performed by soldering with a small soldering iron.

NOTE: Soldering must be performed so that no smoke of resin comes to the HUMICAP 5832 HM Sensor.

8. GUARANTEE

Vaisala Oy issues a guarantee for the functioning of this HUMICAP Humidity Transmitter under normal operating conditins as follows: For material and workmanship; one (1) year from date of purchase; For Humidity Sensor, three (3) months from date of purchase.

Exeptional operating conditions, damage due to careless handling and misapplication do not entitle the user to a guarantee.

9. PARTS LIST

TO BE STATED WHEN ORDERING SPARE PARTS

SYMBOL	PART NO.	DESCRIPTION
		HUMIDITY TRANSMITTER HMT 14
		Integrated Circuits
A1	A 7169	MC 7812
A2	A 7090	LM 317 T
A3	A 6070	LM 324
D1	D 6195	4049 Dual-in-line
		Transistors and Diodes
V1,V2	V 3884	Diode 1N 4148
V3	V 4172	Zener 1N 751 A
V5,V6	V 6879	Transistor 2N 3229
V7...9	V 3884	Diode 1N 4148
V10	V 5565	Transistor 2N 2219
		Capacitors
C1,C2	C 3252	1 µF electrolyte, tantal
C5	C 3252	1 µF electrolyte, tantal
C6	C 6449	22 nF ceramic
C7	C 5654	10 nF ceramic
C8	C 5729	39 pF ceramic
C9	C 6646	150 pF ceramic
C10	C 5654	10 nF ceramic
C11	C 5719	4,7 pF ceramic
C12,C13	C 5729	39 pF ceramic
C14	C 6646	150 pF ceramic
C15...17	C 5654	10 nF ceramic

R	3632		
R	0 94		
R	774		
R	7742		
R	5525		
R	7524		
R	0059		
R	3 50		
R	7526		
R	7 73		
R	7		
R	7		
R	7743		
R	7521		
R	7		
R	7		
R	3		
R	3		
R	7		
R	7		
R	7

TO BE STATED WHEN ORDERING SPARE PARTS

SYMBOL	PART NO.	DESCRIPTION	
		Resistors	
R1	R 3692	1 k trimmer potentiometer	
R2	R 0194	249 Ω 1 %	
R3	R 7143	100 k 1 %	
R4	R 7143	100 k 1 %	
R6	R 5526	390 Ω	
R7	R 5388	10.0 k 1 %	
R8	R 5085	2 k trimmer potentiometer	
R9	R 5388	10.0 k 1 %	
R10	R 5526	390 Ω	
R11,R12	R 5388	10.0 k 1 %	
R13	R 6645	10 k trimmer potentiometer	
R14	R 3176	5.62 k 1 %	
R15	R 7143	100 k 1 %	
R16,R17	R 7393	4.87 k 1 %	
R18	R 7143	100 k 1 %	
R19	R 5812	500 Ω trimmer potentiometer	
R20	R 5811	200 Ω tirmmer potentiometer	
R21	R 6375	1 k 1 %	
R22	R 5164	5 k trimmer potentiometer	
R23	R 7140	205 Ω 1 %	
R24	R 5188	866 Ω 1 %	
R25,R26	R 7143	100 k 1 %	
R27	R 6645	10 k trimmer potentiometer	
R28,R29	R 7143	100 k 1 %	
R30	R 6373	100 Ω 1 %	
		Miscellaneous	
			Qty
X1S,X2S	X 7115	Terminal block 3-pole	2
X3S..17S	X 5761	Connector	15
X1P,X2P	X 5158	Coaxial connector, Suhner 82-SMB	2
X3P	X 6866	Connector 10-pin, Molex	1
X4P	X 6865	Connector 9-pin, Molex	1
X5P	X 6866	Connector 10-pin, Molex	1
X6P,X7P	X 5760	Jumper	2
		Circuit board 1 PHM 49	1
	7040	Box Rose	1
		Bushing, Rose WD 11	1

Connector 10-pin Molex
Circuit board 2 PKM 30

TO BE STATED WHEN ORDERING SPARE PARTS

SYMBOL	PART NO.	DESCRIPTION	Qty
		LINEARIZATION UNIT	
		Integrated Circuit	
A1	A 7110	LM 358 N	
		Diodes	
V1	V 5001	Light emitting diode TIL 209	
V2	V 3884	Diode 1N 4148	
		Resistors	
R1,R2	R 6587	220 k	
R3	R 5543	10 k	
R4	R 3916	1.5 M	
R5	R 6406	1 M trimmer potentiometer	
R6	R 3915	1 M	
X1S	X 4525	Connector 10-pin. Molex	1
		Circuit board 2 PHM 50	1

Coaxial connector Sunner 11-SMS
Connector
End piece
Humidity Sensor
Temperature
Plastic Grid
Sintered Filter 139 um (option)
Table 25 cm, model UT
Table 180 cm, model UTA
O-ring Ø 9,3 x 1,5
O-ring
Fastening nut

TO BE STATED WHEN ORDERING SPARE PARTS

SENSING HEADS HMH 14

SYMBOL	PART NO.	DESCRIPTION	Qty
X1S,X2S	X 5161	Coaxial connector Suhner 11-SMB	2
X1P...3P	X 7401	Connector	3
	6220	End piece	1
	5832	Humidity Sensor HUMICAP 5832 HM	1
	R 3593	Temperature Element Pt 100 1/1 DIN 43760,	1
	6221	Plastic Grid	1
	0195	Sintered Filter 133 µm (option)	1
	4737	Cable 25 cm, model UT	1
	4737	Cable 180 cm, model UTA	1
	6277	O-ring Ø 8,5 x 1,5	1
	4387	O-ring Ø 16 x 2, model UT only	1
		Tube	1
		Fastening nut	1

HMT 14
Humidity Transmitter
Circuit Diagram

HMT 14
Humidity Transmitter/Linearization Unit
Circuit Diagram

HMT 14
Humidity Transmitter
Components Layout

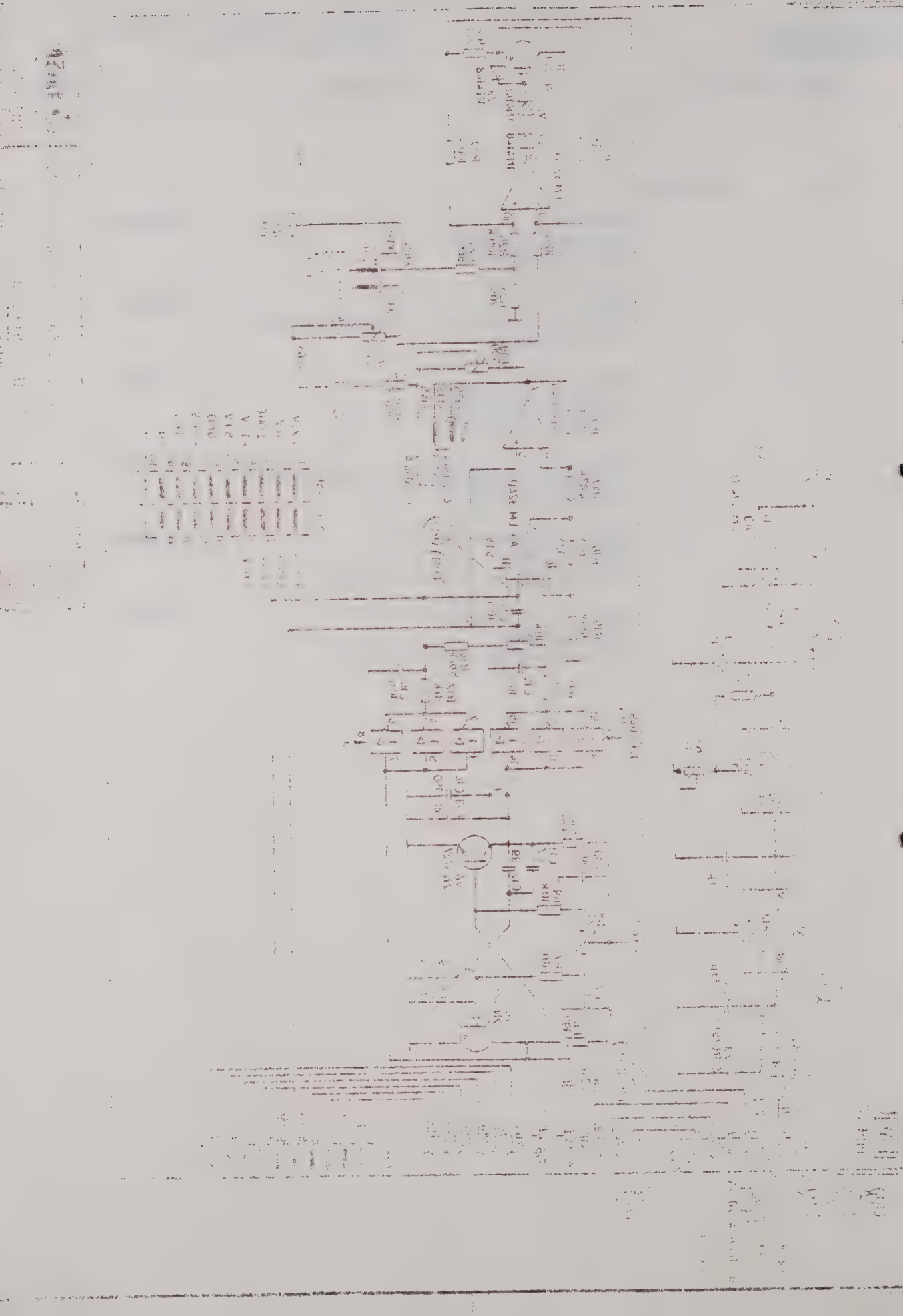
HMT 14
Humidity Transmitter/Linearization Unit
Components Layout

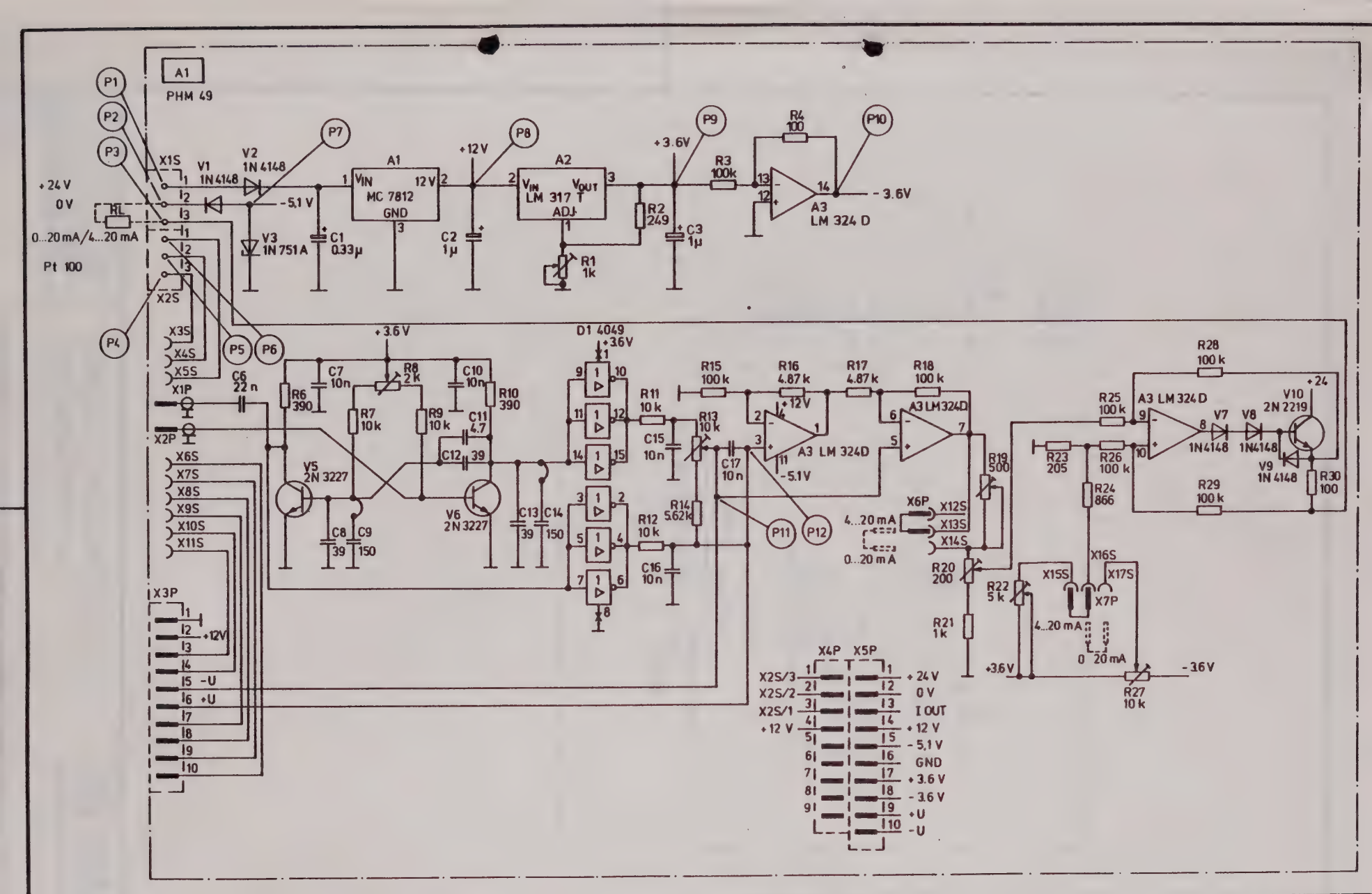
HMH 14 U and HMH 14 UT
Circuit Diagram and Dimensions

HMH 14 UA and HMH 14 UTA
Circuit Diagram and Dimensions

10. DRAWINGS

HMT 14 Humidity Transmitter Circuit Diagram	HM 3642
HMT 14 Humidity Transmitter/Linearization Unit Circuit Diagram	HM 4641
HMT 14 Humidity Transmitter Components Layout	HM 3644
HMT 14 Humidity Transmitter/Linearization Unit Components Layout	HM 4645
HMH 14 U and HMH 14 UT Sensing Head Circuit Diagram and Dimensions	HM 3668
HMH 14 UA and HMH 14 UTA Sensing Head Circuit Diagram and Dimensions	HM 3669





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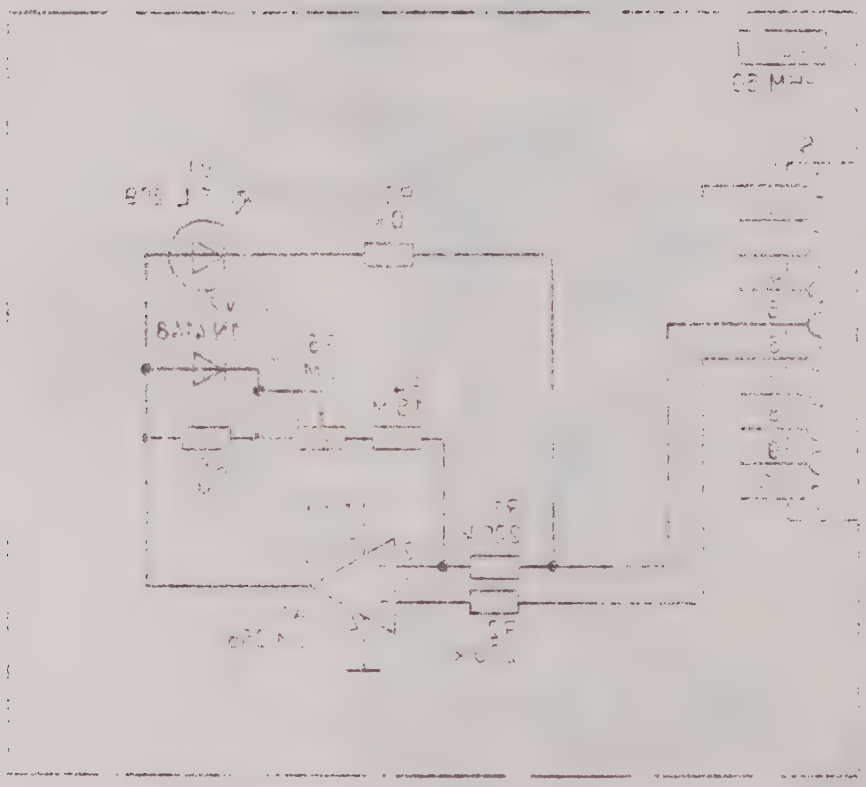
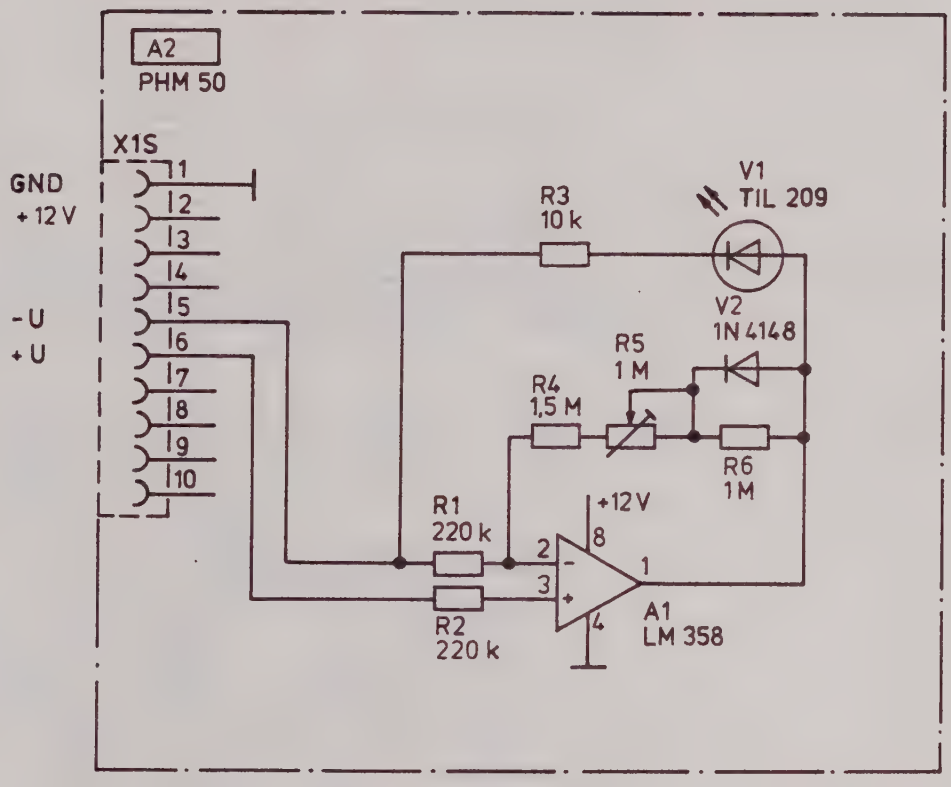
TARK.	CIRCUIT DIAGRAM	HM 3642
SUUNN. 80-12-17 PHK		
LIITTYY:		
VANHA:		
UUSI:		
LAITE NO 3344-	T S R Q P N M L K J H G F E D C B A	





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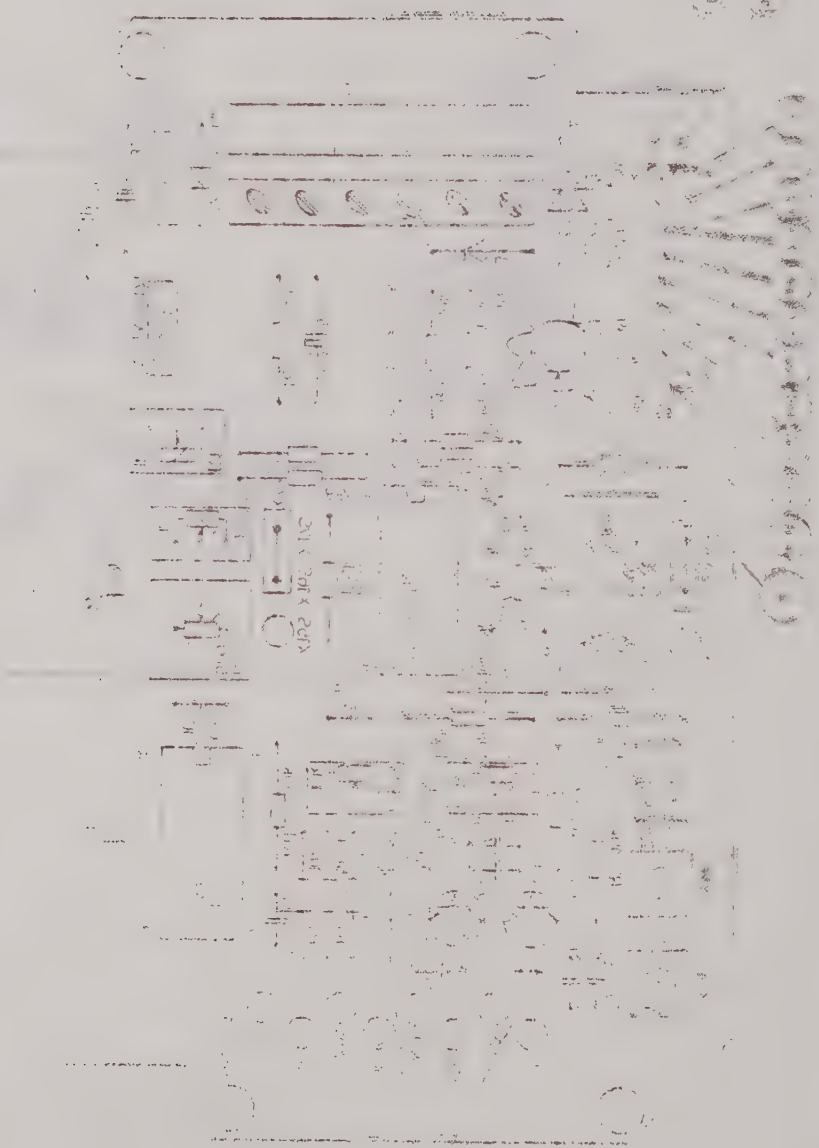
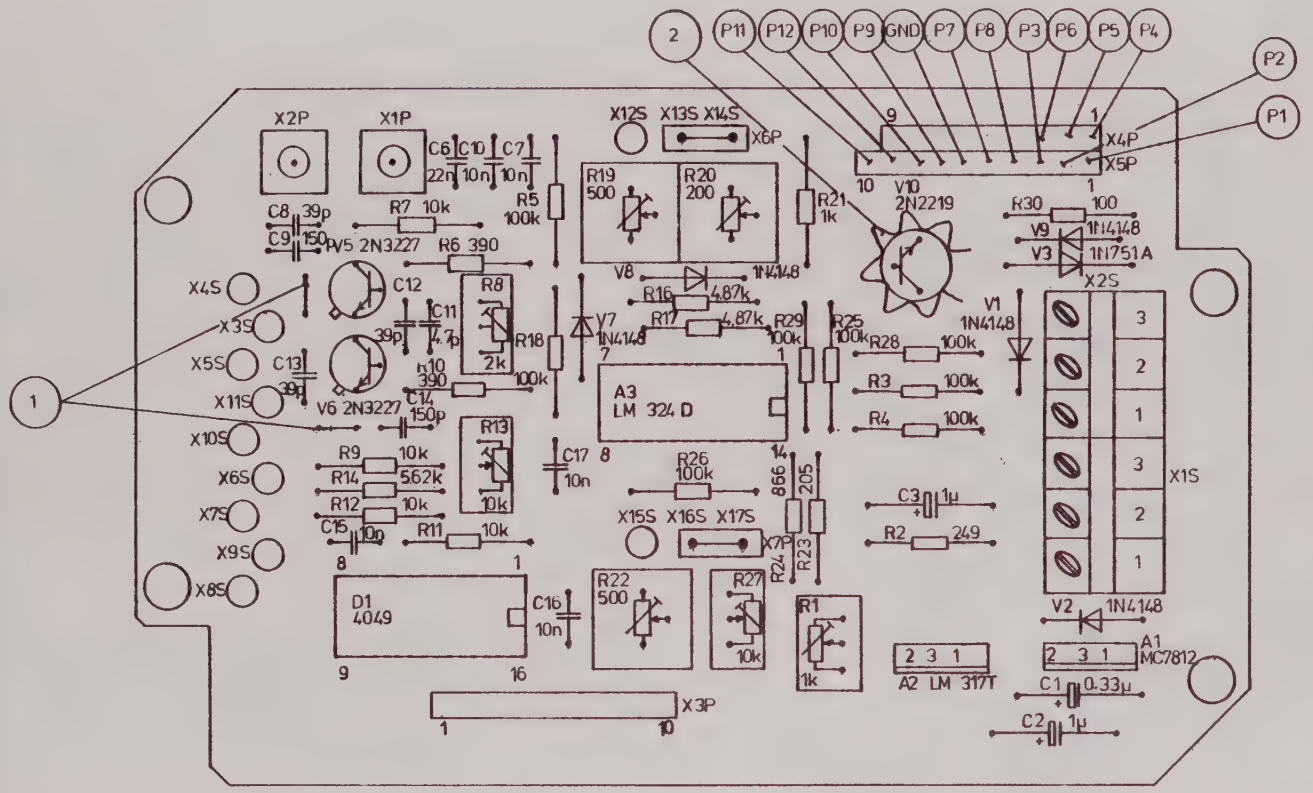
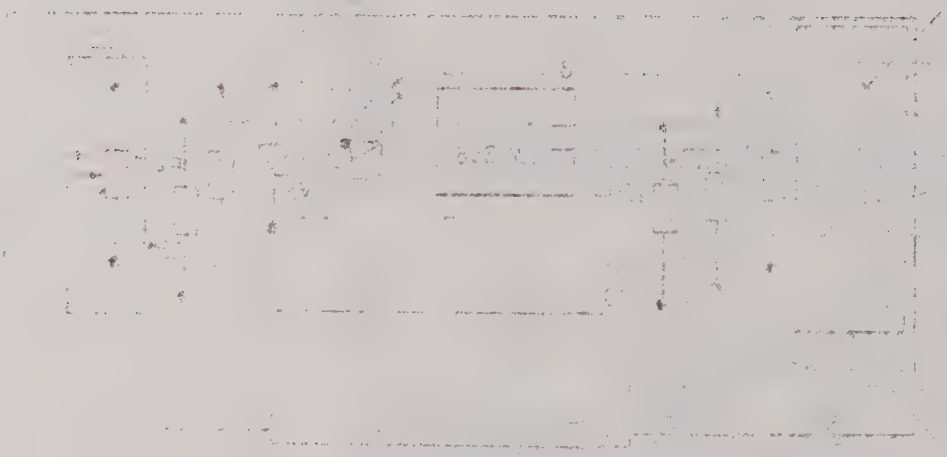
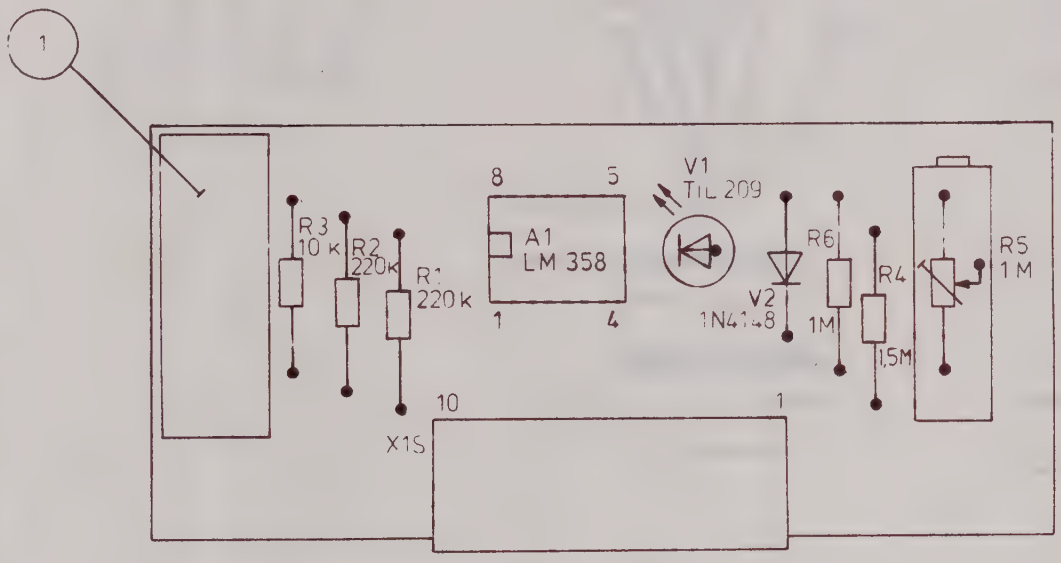
TARK. 80-10-22 OW		
SUUNN. 80-10-22 PHK		HM 4641
LIITTYY:		
VANHA:		
UUSI:	LAITE NO 31105-	T S R Q P N M L K J H G F E D C B A



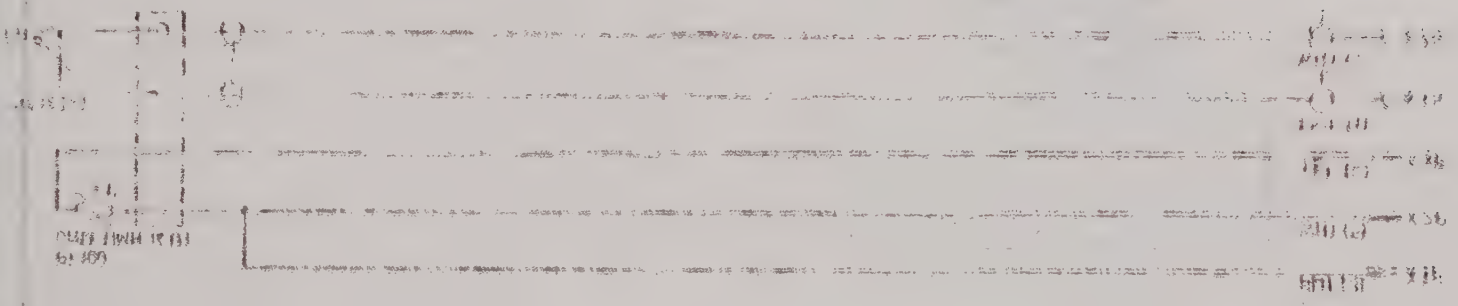


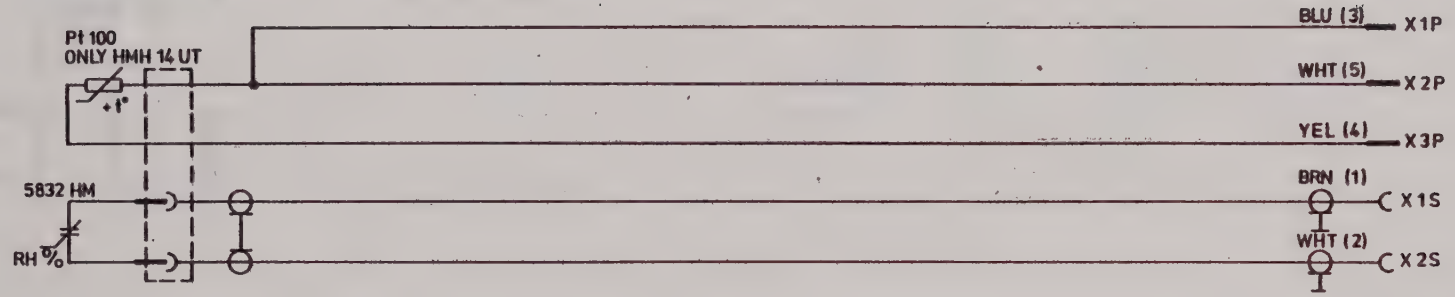
PIIRT. 81-04-29 AP	HUMIDITY TRANSMITTER HMT 14	VAISALA OY
TARK.		
SUUNN. 81-05-04 PHK	COMPONENTS LAYOUT A1	HM 3644
LIITTYY: PHM 49		
VANHA:		





PIIRT.	HUMIDITY TRANSMITTER HMT 14	VAISALA OY
TARK.	LINEARISATION UNIT	
SUUNN.	COMPONENTS LAYOUT A2	HM 4645
LIITTYY:		
VANHA:		
UUSI:	LAITE NO	T S R Q P N M L K J H G F E D C B A

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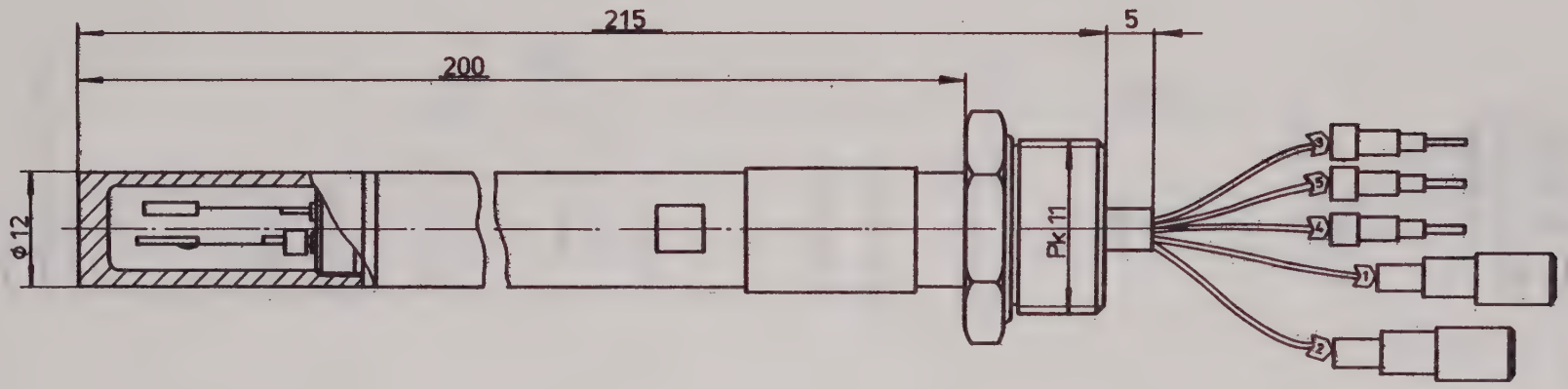
ONLY HMH 14 UT
+t°
5832 HM
RH %
BLU (3)
X1P
WHT (5)
X2P
YEL (4)
X3P
BRN (1)
X1S
WHT (2)
X2S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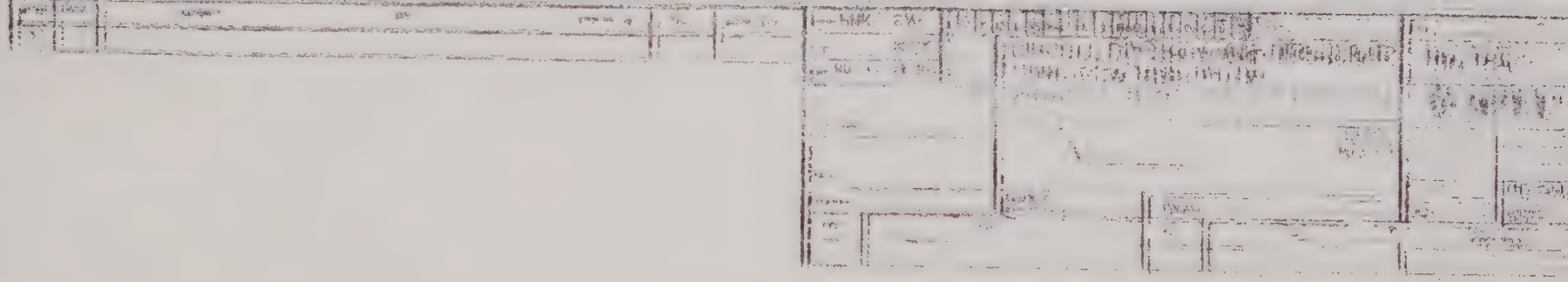

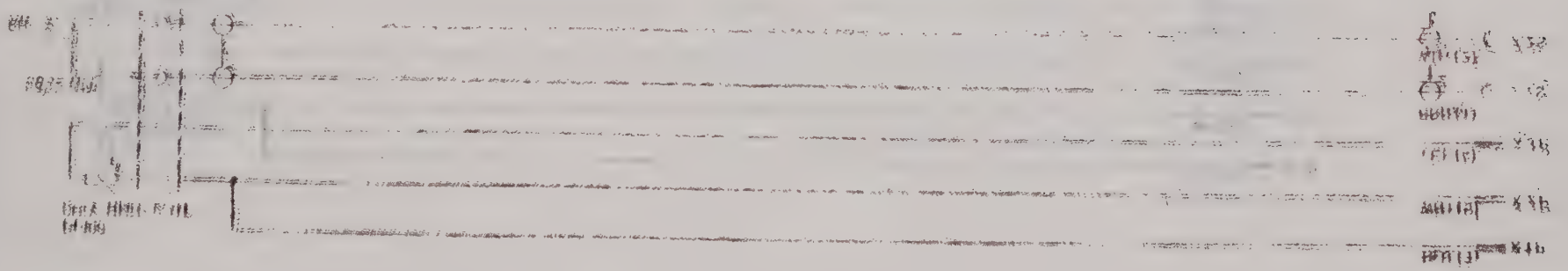

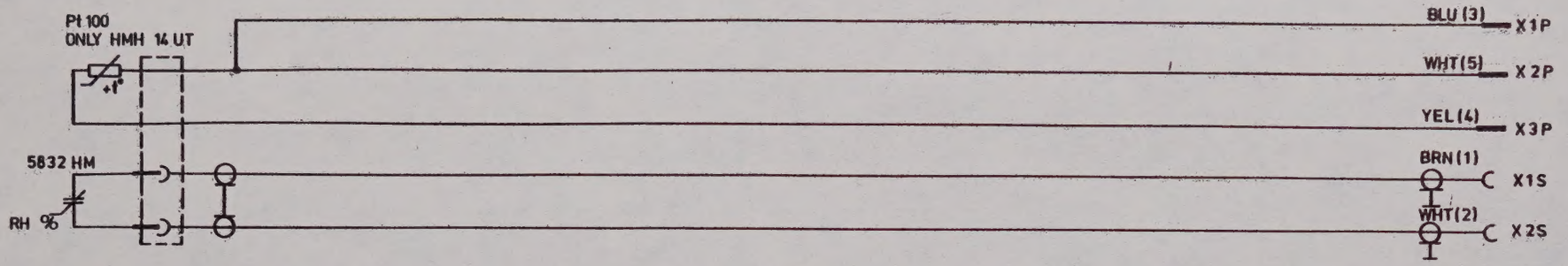
Pt 100
ONLY HMH 14 UT
+t°
5832 HM
RH %
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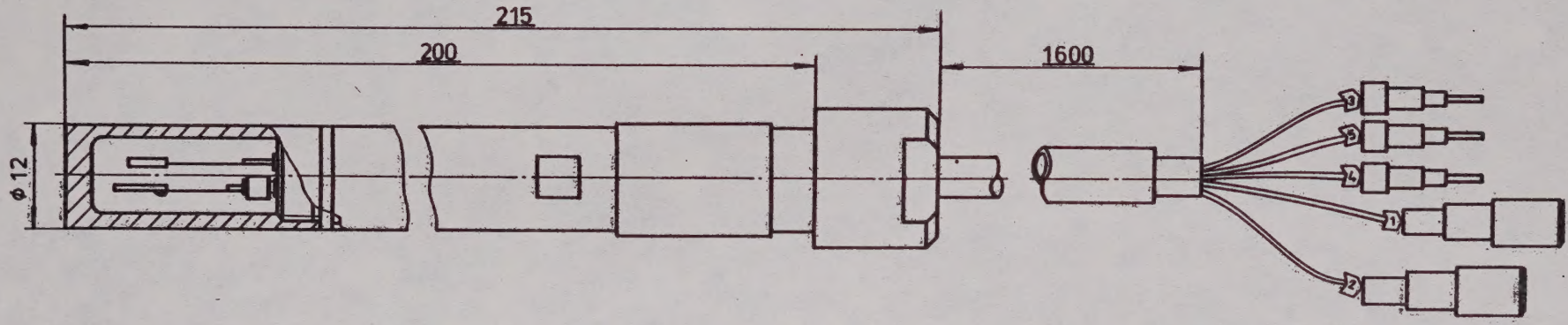
X1P
WHT(5)
X2P
YEL(4)
X3P
BRN(1)
X1S
WHT(2)
X2S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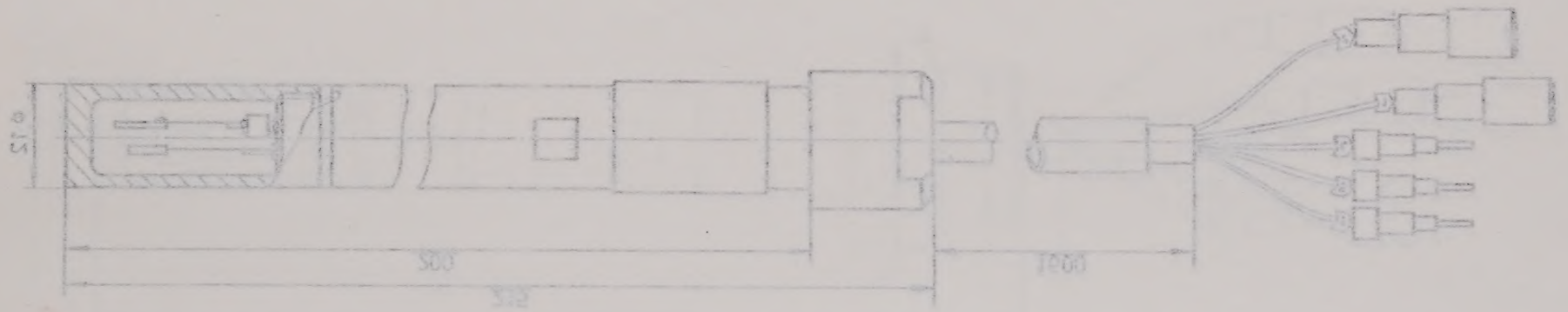

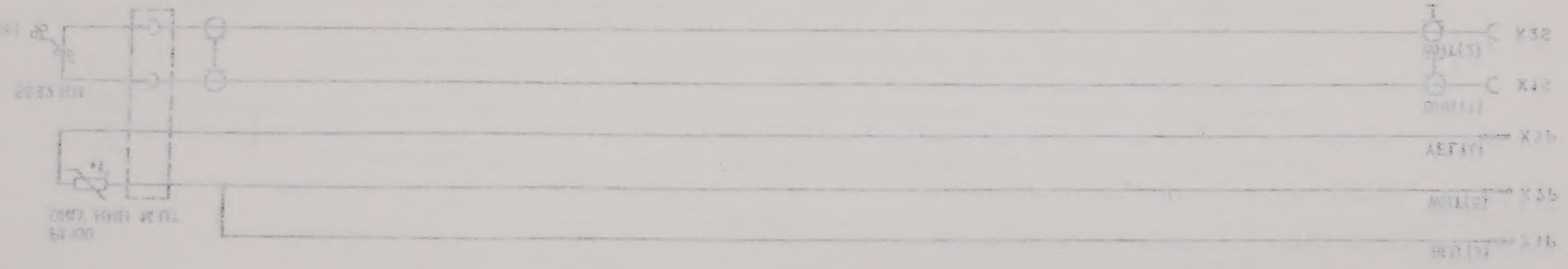

MP MASTER
MA25206